

BUSINESS INTELLIGENCE BENEFITS AND ITS AREAS

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ABSTRACT

The amount of the information in business is growing at a very high rate. Turning information into knowledge is important for a successful enterprise. Guided by the increased competitiveness due to changing business models and the growth of the demand for new applications, many companies are adopting Business Intelligence (BI) technologies and systems that help the decision making process. Companies have realized the importance of implementing BI strategies in achieving their business goals. Many of them are making BI functionality more useful for all decision makers, officers, managers and employees who deal with clients. Product quality specialists can now use the appropriate data and information to analyze the quality of the product. After a successful analysis of data on products they can find rules and patterns that lie behind and consequently help the quality analysts and managers to make better decisions regarding quality management. This paper focuses on benefits offered by BI in the decision-making process by analyzing the factors, technologies and best techniques for the implementation of BI.

Keyword: Business Intelligence (BI), Data Warehouse, OLAP, MapReduce.

1. INTRODUCTION

Organizations are constantly generating data. With today's modern IT systems however, organizations are collecting ever increasing volumes of data and it is no longer possible to analyze such data without specialized tools and methods [8]. They have large volumes of detailed operational data, data warehouse and data in business processes, memos, presentations, streaming video, making in-app purchases, sending email, or while conversation. In order for the organizations to keep the profitability, they need to respond agilely to the changes and make quick decisions. The nature of these decisions is that they need to be made in a short time and have to be accurately made as well to include all the generated information. Considering the risks of such decisions, organizations and scientists have been looking for ways to get support from computers and information systems in order to minimize risks [19]. According to Negash the variety of information inputs available to provide the intelligence needed in decision making can be form structured to unstructured data (Fig -1).

With the introduction of Business Intelligence(BI) system power of analytics can be translated into responding to a lot of data related organizational demands from top management to lower ranks throughout the whole organization [5]. The goal of BI software is to meet the growing need for companies to handle the large quantity of data they receive, as easily and quickly as possible.

BI systems are able to take both structured and semi-structured data and turn them into valuable transformed information and knowledge that can be used to make timely decisions [18]. The structured inputs are the ones existing in:

- DW(Data Warehouses),
- DM(Data Mining) tools,
- OLAP(On-Line Analytic Processing),

- EIS(Executive Information Systems) and
- ERP(Enterprise Requirement Planning) systems.

The unstructured and semi-structured sources can be conversations, graphics, images, movies, news items

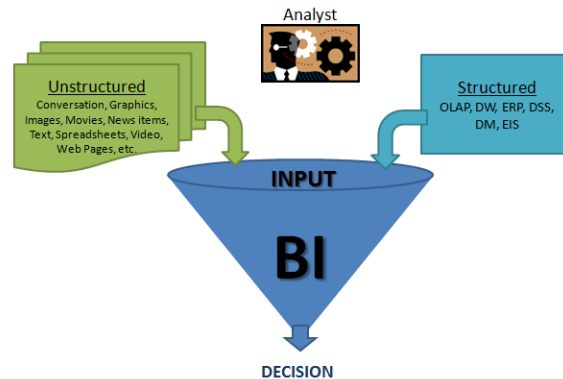


Fig -1: Type of data in organization (Negsh 2003)

spreadsheets, text, videos, web pages and business processes that are all popular ways of gathering and showing data. Research and surveys show that 85% of data in organizations is semi-structured or unstructured data and managers insist on using these sorts of data because of their value and ease of access and use within organizations. A survey shows that 60% of CIOs consider semi-structured data critical for improvements in the operations and new opportunities within the organizations [3]. To create information out of scattered data, data is brought from enterprise systems such as ERP systems and sent to the next stage called ETL (extract, transform, and load). At this stage, data will be standardized and cleaned for analysis. Then the clean data will be transferred to a data warehouse (DW). Different analytical activities such as data-mining and online analytical processing (OLAP) will be done on the data stored in DW. All these steps are mostly used for structured data [13].

As BI trends and techniques bring support and inevitably changes to the organizations, organizations as well have influences on newer BI capabilities in order to support upcoming, ever-changing demands [19]. Traditionally, BI technologies are developed and implemented for the gathering and storing of structured data [1]. But only the combination of structured and unstructured data will provide decision-making with actionable information.

2. BUSINESS INTELLIGENCE

Business and organizations receive a vast amount of information from different resources-typically from multiple operational databases across departments within the organization, as well as external vendors, the main problem in taking the operational decision is to focus on the right information. In today's rapidly changing business environment, organizational resourcefulness depends on operational monitoring of how the business is performing and mostly on the prediction of the future outcomes which are critical for a sustainable competitive position. Intelligence becomes an asset only if it is used in the business decision making [7]. Implementing a BI system can help to identify the causes and reasons of certain occurrences thus, helping the business to make predictions, calculations and analysis; so that the needed knowledge is successfully extracted from the data and that the proper decisions are made. BI consists of a wide range of analytical softwares that provide the information of taking better decision by every user of the business, such as analyzers, managers and operators. The information is in real-time and supports reporting on every organizational level.

According to Blomme, traditionally, BI systems provide a retrospective view of the business by querying data warehouse which contain historical data. On the contrary, contemporary BI-systems analyses real-time event streams in memory [2].

BI is implemented to give users access to information in their systems in an automatic and efficient way. The users need not to have any technical knowledge of the underlying system because all data gathering are performed automatically by the BI systems.

3. BI COMPONENT

Efficient Business Intelligence connects business with information technology (IT) so that the available resources can be allocated with respect to their own capabilities, as well as provides intelligent problem solutions [15]. Figure 2 describes the BI architecture according to Chaudhuri [4].

Different sources store different data quality, use inconsistent representations, codes, and formats, which have to be reconciled. Thus the problems of integrating, cleansing, and standardizing data in preparation for BI tasks can be rather challenging. Once the data are gathered and stored in a DW can be easily analyzed with the help of BI tools, such as reports, OLAP, and data mining. These analytic tools have the potential to provide actionable information that can be turned into valuable information on which the companies base their decisions.

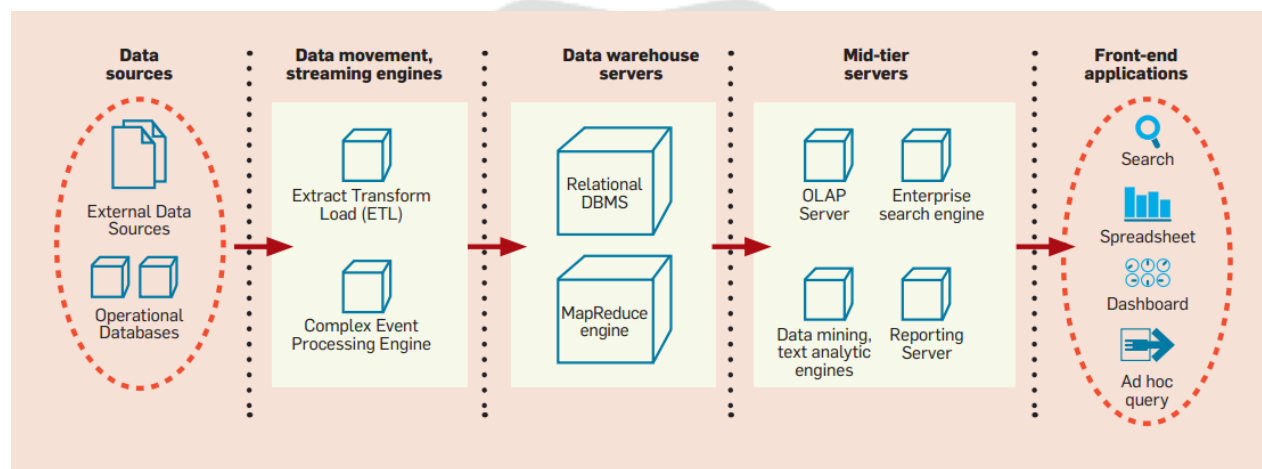


Fig -2: BI Architecture

ETL refers to three separate functions that prepare the data for BI. The Extract function extracts desired subset of data from data sources, such as orders, invoices, shipping, web clicks, external data, etc. [10]. The Transform function is used to transform acquired data into a desired state, using rules or lookup tables, or creating combinations with other data. Finally, the Load function is used to write the resulting data to a target database. The most time consuming of the ETL process is the transform function, especially when the source databases are heterogeneous and distributed/decentralized. Inconsistent codes, handling incomplete data and changing codes to meaningful terms are all part of the transform process. Data from the ETL are loaded into the data warehouse, or DW. According to Inmon "A data Warehouse is a collection of integrated, subject-oriented databases designed to support the Decision Support System (DSS) function, where each unit of data is relevant to some moment in time"[11]. The engines used for storing and querying warehouse data are: Relational Database Management Systems (RDBMS), Engines based on the MapReduce [6] paradigm, built for analyzing Web documents and Web search query. Such engines are currently being extended to support complex SQL-like queries essential for traditional enterprise data warehousing scenarios.

As show at Figure 2 , BI systems operation are:

1. Data from the external data sources or operational databases is transformed to the unified format and loaded to the data warehouse; alternatively data can be processed by the CEPs in the real time.
2. When the data is processed, it is loaded either into the data warehouse which can be represented by the relational database, MapReduce or Apache Spark engine depending on the volume and requirements for data processing.

3. After that on the mid-tier server levels the actual business intelligence analytics is performed, which can include OLAP processing, enterprise search, reporting or data mining. As an output the end-users receive information for the decision-making process in the front-end applications with the friendly user interface. Such applications, can be represented by search tools, dashboards, ad hoc query tools, spreadsheets, digital cockpits, charts etc.
4. OLAP is a technology designed to provide high performance for query-business case. OLAP is designed to operate efficiently with the data organized according to common dimensional model used in the data warehouse. A data warehouse provides a multidimensional view of data in an intuitive model designed to suit the requirements raised by analysts and decision makers. OLAP organizes data warehouse in multidimensional cubes based on this dimensional model, and then processes these cubes to provide maximum performance for query-that multiply the data in different ways.
5. Data Mining (DM) is the analysis knowledge which discovers new patterns from large data sets and involves statistical and artificial intelligence methods. DM engines enable in-depth analysis of data that goes well beyond what is offered by OLAP or reporting servers, and provides the ability to build predictive models to help answer questions such as: which customers are likely to respond to my upcoming new products campaign?

4. BENEFITS PROVIDED BY IMPLEMENTING BI

BI can offer different benefits to a business including improvement on ROI, effective decisions, better plans for the future and an improvement in the customer satisfaction. BI, when well-conceived and properly implemented, allows all users to make informed choices and decisions every time and in every situation. Additionally, information gleaned from a competent BI installation makes employees more productive, suppliers more efficient, and customers more loyal [12]. Within the BI tools market, the end-user query, reporting, and analysis segment accounts for 81.9% of the revenue [20].

Many business use BI to [17] [21]:

- Improve management processes - such as planning, controlling, measuring, monitoring, and/or changing - so that management can increase revenues, reduce costs, or both.
- Improve operational processes – such as fraud detection, sales campaign execution, customer order processing, purchasing, and/or accounts payable processing – so that the business can increase revenues, reduce costs or both.

Reducing costs - Once in place, the BI make possible for regular employees to create reports and also to be able to discover answers to their own questions. It becomes possible to reduce the human resource costs for the organization, and the labor costs [8].

BI systems reduce labor costs for generating reports by:

- automating the data collection and aggregation process,
- automating report generation,
- providing report design tools that make programming of new reports much simpler, and
- reducing training needed for developing and maintaining report.

BI minimizes manual and repetitive work. The BI toolkit and the synchronistic nature of the BI environment help to facilitate a very different orientation to the everyday tasks of data accumulation and processing.

Make data actionable - BI make data actionable in a unified view offering the right information to the right people in the organization. This data quality prevents conflictual definitions and incomparable report data. Data are consolidated from different data sources.

Better and faster decision to business trends - Whether tracking customer buying habits, inventory turns, or other sales and/or operational parameters, any and all of these areas are more readily evaluated and employed in the business decision-making process whenever coherent and consistent BI tools are available. As it turns out, the graphical nature of most BI toolkits consistently and dramatically provide easy access and demand attention to the most useful trends. Indeed, the very nature of the BI toolkit gives rise to a dynamic and readily identified representation of the most pertinent trend data .

Understand consumers behavior - This information is very important and can be used to develop products that match the current consumption trends and consequently improve business profitability since it will be able to attract valuable customers.

Efficiency improvement – BI can improve efficiency within the business and, as a result, increase productivity. Make of data actionable across different departments can save time on reporting processes and analytics. BI can help management accounting reclaim its relevance and assume the key strategic role it needs to play if companies are to succeed in today’s fast paced global economy [21].

Visibility improvement – Investing in a good BI system can improve the organization control over various important processes. BI solution can improve the visibility of processes and make it possible to identify any areas that need improvement.

Customer Satisfaction – When organization provide to customers a product, they want to know how satisfied they are with the process of receiving it. With the collected data BI tool should allow to quickly and simply measure fulfilment rates and delivery times. How fast are orders being fulfilled? Are deliveries being made on time? If not, why? How likely are your customers to purchase from you again? BI enables you to dig into the numbers so you can clearly assess this information and then implement strategies to increase satisfaction.

5. IMPLEMENTATION OF BI

Many businesses have or are implementing Business Intelligence because it is the top CIO technology whose priorities and trends are driving information revolution and innovation [9].

According to Rayner: “Through 2015, predictive and prescriptive analytics will be incorporated into less than 25% of business analytics projects, but will deliver at least 50% of the business value.” [16].

However, as far as Albania is concerned, we conclude that we are at the very beginning of the process: at the point where the business and technological advances promised by BI are still being developed, explored, and enhanced.

Some of the most important softwares for implementing BI solutions are: Congnos (IBM), Microstrategy, Informant Builders, BusinessObjects (SAP), Board, Oracle, SAS Institute, Tableau, QlikView, etc.

BI solutions are implemented in:

In industry - In retail industries, managers use advanced information technology to provide performance and achieve their objectives in the broad field of applications. The use of BI improves commercialization decisions, provides faster response to the requested information, increases employee productivity and provides a better service to customers.

In insurance - The use of BI for insurance systems enables a comprehensive view of business, better service to customers and executes operations in the most efficient manner. Typical questions that requires the insurance industry in respect to BI solutions are mainly related to risk analysis for new customers.

In banks - BI enables an increase in the number of users (to a high number of users) and offers a superior capacity for generating reports, which are easy to use and contain well- detailed analysis of the level of granularity of the data. It provides:

- Analysis of the benefit of the client,
- Management of credit,
- Branches of sales.

Telecommunications industry - BI allows business satisfying requirements of end-user community fully extended. Telecommunications industry requires information such as:

- Portrayal and customer segmentation.
- Demand planning clients.

Manufacturing industry and the use of large - In manufacturing industry, management is using advanced information technology to improve performance and achieve their objectives in the broad field of applications. BI provides a single source for critical information throughout the organization, so it will be less time for data review and more for taking critical decisions. The following are some of the requirements of this industry:

- Sales / Marketing.
- Forecast.
- Customer support.
- Ordering and fulfilment.
- Analysis of purchases / sales.
- Distribution and logistics.
- Management of transportation.

In government system - Information is one of the valuable assets to any not only for business, but also for Government. When used properly, it can help planners, decision makers and employers in making informed decisions leading to positive impact on targeted group of citizens and their needs. BI in government can:

- Improve the exchange of information between government and citizens,
- Assist in the management of public resources and
- Assess the impact of public policies on society.

BI has an important role to play in helping organizations implement and monitor sustainable practices [14]. Recently BI applications are implemented on mobile for data analysis and discovery. This is not only because of the increasing use of the mobiles but also because of the request to have the right information at any time, everywhere.

6. CONCLUSIONS

Business Intelligence and the power of decision making have made undeniable impacts on organizations and how they work. Decisions are being made by the support of analytic power of BI systems which in return will bring competitive advantages to the organizations.

Sources of data are rapidly growing both outside of and within the organizations. Business intelligence efficiency would be achieved, only if in BI system are implemented all structured/unstructured data of the business. The implementation of the data should be done by the high specialized employers of different sectors always supervised by the technical business intelligence staff. A well-deployment of business intelligence is a source of competitive advantage for enterprises.

By implementing the Business Intelligence enterprises can gather large return on investment with a lower cost, make faster and better decisions, and use more effectively the information assets of the organization.

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BIOGRAPHIES



Blerta MOÇKA graduated on Computer Science at the Faculty of Natural Sciences where she obtained her MSc in 2009. Joined the PhD program March 2012. Interested in the field of Business Intelligence. Current position Lecturer at Faculty of Economics and Agribusiness, Agricultural University of Tirana and part time lecturer at Faculty of Natural Sciences.